Tracking Earthquake Frequency and Intensity in Oklahoma

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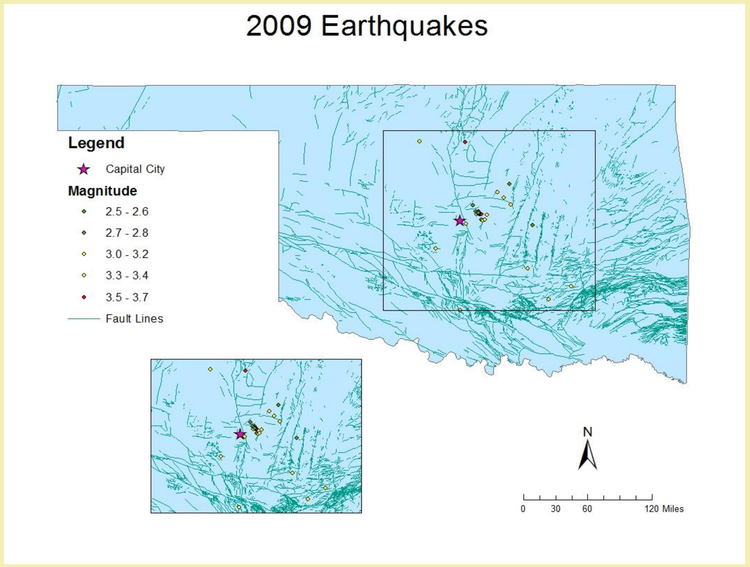
Abstract

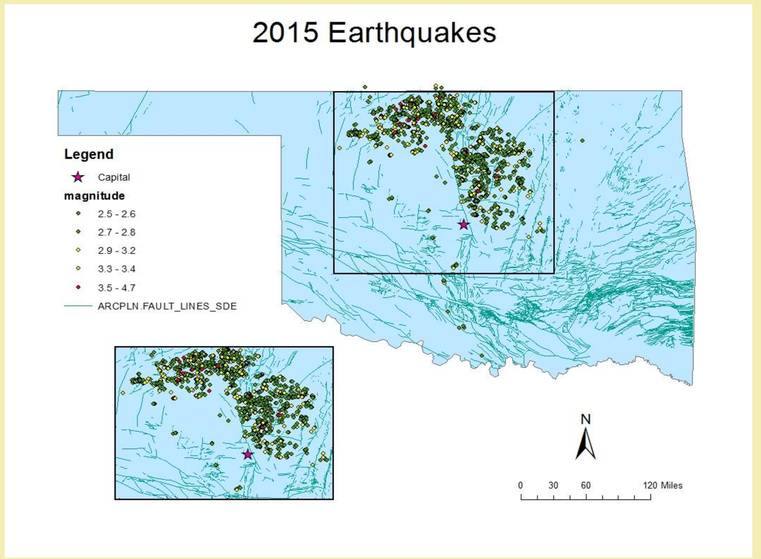
The purpose of this project is to show the dramatic increase of earthquakes that have occurred in Oklahoma over the past eight years that have been correlated to fracking in the area. Starting in 2009, before fracking took place in Oklahoma, there were a total of 33 earthquakes throughout the whole year. In 2010, when fracking began in Oklahoma, the number of earthquakes spiked to over 100 in one year. The number of earthquakes grew over the years and in 2015 there were over 2,000. Data from 2016 were also used but only through the month of September, the year 2016 was used because fracking has stopped being used in the state due to the earthquakes. Along with the sheer increase in the number of earthquakes, their depths from which they have occurred have also increased during this eight year period. This means that the earthquakes went from being relatively shallow before fracking to earthquakes occurring deeper in the Earth after fracking started injecting waste water down deep into the Earth. A correlation can be drawn between these two events to add to the accumulating data pointing directly to fracking being the cause of these earthquakes in Oklahoma.

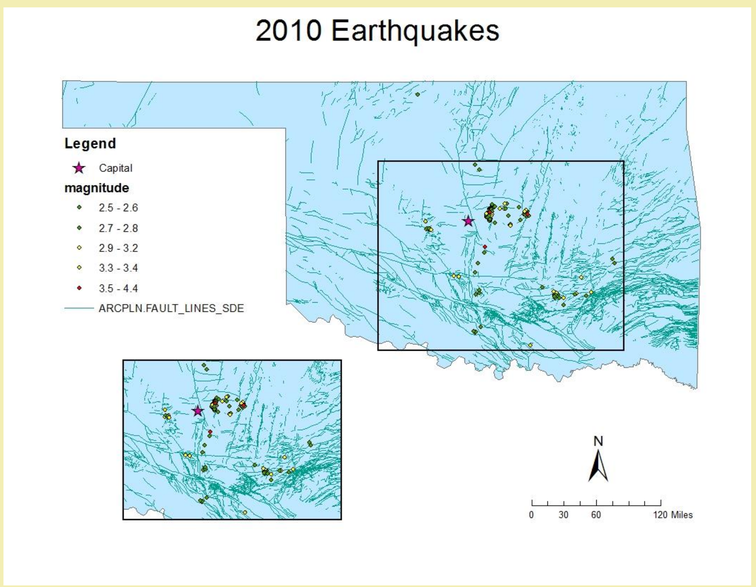
Introduction

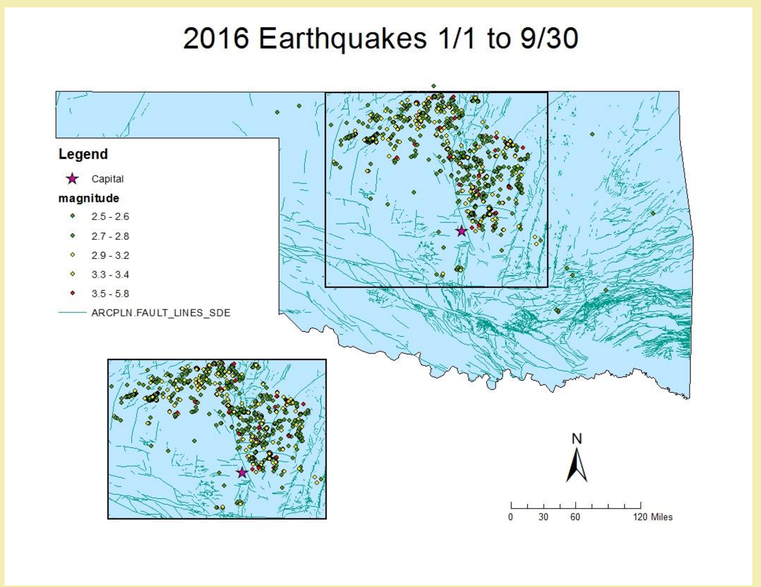
Starting in 2010, there has been a notable increase in the number of earthquakes occurring in Oklahoma. Many scientists have attributed this seismic activity to fracking that began in the area around the same time. Fracking is the process of drilling down into the Earth and injecting ‘water’ at high speeds and pressure into gas and oil rich rock in order to fracture the rock and get to the contents inside. Since then, the number and intensity of earthquakes have been on a rise through the years. Using 2009 as a sort of control group from before fracking started, this is what all the other maps are compared to when seeing how much seismic activity in the area has increased.

Results









Methods

All of the earthquake data collected was from the USGS earthquake tracker online. Here, a rectangle was drawn around Oklahoma as the study area, and input the time frame needed. From there the data was exported into an excel spreadsheet. That spreadsheet was then used in ArcMap to project the location of the earthquakes. The Oklahoma shapefile and the fault lines layers were obtained from ArcMap online.

Conclusions

When looking at 2009, there was a total of 33 earthquakes with the largest earthquake being a magnitude of 3.7. Between 2009 and 2010, there was a 324% increase in the number of earthquakes that occurred, and the largest magnitude was a 4.1. From 2010 and 2015 though, the number of earthquakes increased by 1779% and the largest magnitude jumped to a 4.7. So we can see that as time progresses, the number of earthquakes occurring is dramatically increasing as well as the magnitude in which they are happening.

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